

Technical News Bulletin

of the
National Bureau of Standards

★ Issued Monthly ★

Washington

SEPTEMBER 1938¹

Number 257

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VEHICLE SCALES: SELECTION, INSTALLATION, AND MAINTENANCE

Practical advice on the selection, installation, and maintenance of scales for weighing highway vehicles is given on a printed sheet known as Form NBS 256, which has just been prepared by Ralph W. Smith of the Bureau's Weights and Measures Division.

The difference between "wagon" and "motortruck" scales is explained, the former being designed for vehicles in which the weight is approximately equally distributed on all four wheels, while the latter can be used when the vehicle has 85 percent or more of its weight concentrated over the rear axle.

The importance of selecting a scale of sufficient length is emphasized, since many trucks have a long wheel base, and some power units and trailers can be uncoupled only with difficulty.

The use of an adequate specification, adherence to which is required in the purchase contract, is recommended as the best insurance that the scale will prove satisfactory.

Even an excellent scale will not give good service unless satisfactorily installed. The importance of a proper site with smooth straight approaches and a deep and well-drained pit is pointed out, as well as the necessity of carefully checking the alignment of the scale parts before acceptance. Inspections during installation and a final inspection after the job is finished should be conducted with care. The tolerance recommendations of the National Conference on Weights and Measures, as embodied in the Bureau's Handbook H22, should be followed in the acceptance test of the scale.

Proper maintenance is essential if the scale is to render satisfactory service over a long period. The pit and the parts of the scale should be kept clean. Bearings should be well packed in grease, which must not be allowed to become hard. Interference between the scale platform and coping of the pit should be particularly guarded against.

Finally, the form stresses the importance of maintaining a correct zero-load balance and of not overloading

¹ Published with approval of the Director of the Budget.

the scale. Periodic inspection by a competent scale mechanic is recommended.

Copies of this form will be sent on request to weights and measures officials, to bona fide owners of vehicle scales, to purchasers of new scales, and to others interested. Requests should be sent to the Weights and Measures Division, National Bureau of Standards, Washington, D. C.

VEHICLE-SCALE TESTING SERVICE 1936-38

A 39-page mimeographed report of the "Vehicle-Scale Testing Service of the National Bureau of Standards Conducted in Cooperation with the States, November 1936 to May 1938", has just been issued. This is the first of a series of reports on the subject which it is planned to issue annually. Each report will summarize the results in this field from the beginning of the service and will include such analyses, comments, and recommendations as may be considered timely and appropriate.

The report summarizes the results of 967 tests of vehicle scales which were conducted by the Bureau in the following 16 States: Virginia, North Carolina, South Carolina, Georgia, Florida, Maryland, Delaware, Rhode Island, Maine, New Hampshire, Vermont, New York, Alabama, Mississippi, Louisiana, and Tennessee. It is arranged in five major divisions: (1) statistical data on tests and inspections; (2) newly installed motortruck scales; (3) method of test and inspection of vehicle scales developed by the Bureau; (4) requirements for corner tests of vehicle scales; and (5) statement of vehicle-scale tolerances, and related specification paragraphs.

Copies of this Letter Circular LC529 may be had on application to the Weights and Measures Division, National Bureau of Standards, Washington, D. C.

SYMPOSIUM ON NOMENCLATURE OF SUGARS AND THEIR DERIVATIVES

Even though carbohydrate chemistry has developed to the point where it is now possible to apply a rational system of nomenclature, many ambiguous and unsatisfactory names are in common use. The time is ripe for simplification and, therefore, the carbohydrate

chemists of this Bureau, with the cooperation of others in this field, have arranged a symposium on the nomenclature of the sugars and their derivatives to be held by the Division of Organic Chemistry, Division of Chemical Education, and Division of Sugar Chemistry and Technology, of the American Chemical Society at the Milwaukee Meeting on September 8, 1938. The purpose of the symposium is to bring together the workers in carbohydrate chemistry to discuss and record their views with the ultimate object of obtaining a more systematic and uniform system of nomenclature.

QUANTITATIVE FORMATION OF FURFURAL FROM XYLOSE

The study of the accurate determination of pentosans which is being made at the Bureau by Elizabeth E. Hughes and S. F. Acree, has been continued to include an investigation of the quantitative production of furfural from xylose. This work is reported in the Journal of Research for September (RP1132).

The present standard method for pentosans gives about 88 percent of furfural. Various methods of distillation, using solutions of furfural and xylose, have been studied with the object of increasing the yield. The possible sources of error were considered, and means of preventing or evaluating them are given. Evaporation losses were prevented by using a closed system. The decomposition that was found to occur when furfural was subjected to relatively high temperatures in 12-percent hydrochloric acid, or by prolonged contact with the hot acid, is prevented if the distillation proceeds without superheating, and the furfural is produced and removed rapidly. The use of ground-glass connections prevents errors caused by contact of hot vapors with rubber. The aniline-acetate test for furfural is improved; and the determination of furfural formed from hexuronic acid is discussed, as is the presence of hydroxymethylfurfural in the distillate.

The procedure developed employs 12-percent hydrochloric acid saturated with sodium chloride to accelerate the formation of the furfural, which is then removed by steam distillation and determined by bromate-bromide titration. This prevents decomposition of the furfural, and gives a practically quantitative yield of furfural from xylose.

CIRCULAR ON PROPANE, BUTANE, AND RELATED FUELS

The distribution and utilization of the hydrocarbon fuels, which can be conveniently and economically transported and stored as liquids under pressure but used as gases, is a relatively new and rapidly growing industry. These fuels are mainly composed of the chemical substances propane and butane, but they are sold under a host of trade names. Letter Circular LC503, written to answer the large number of inquiries about these fuels received by the Bureau, has been revised and printed as Circular C420, Propane, Butane, and Related Fuels, by E. R. Weaver. It describes the properties, sources, and methods of distributing the gases. There is a brief discussion of methods of storage and utilization, including the cost and uniformity of service, particularly with domestic appliances. Domestic systems using hydrocarbons which boil above ordinary household temperatures are included in the discussion. Leading distributors and trade names are listed.

Copies of this publication are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

SOME PHYSICAL CONSTANTS OF A FEW HYDROCARBONS AND THEIR STRUCTURAL ISOMERS

Boiling points and rates of change of boiling points with pressure of some isomeric hexanes, heptanes, octanes, nonanes, and xylenes were determined. The data confirm the rule postulated in the October 1936 Journal of Research (RP921) that the dt/dp coefficient is an additive property whose magnitude is not greatly affected by the rearrangement of a molecule. The entropy of vaporization of structural isomers has a substantially constant value.

PRODUCTION OF ONE-SECOND TIME INTERVALS

Standard frequencies now broadcast from the Bureau's radio station WVV are 1, 440, 1,000, 5,000,000, 10,000,000, and 20,000,000 c/s. At the transmitter these frequencies are all accurate to better than 1 part in 5,000,000 when the measurement is against the average of about 10 cycles of any of the frequencies.

RP1136, by William D. George, in the September Journal of Research, de-

scribes the technique by which the highly accurate frequency of 1 c/s is obtained for broadcasting. Multivibrators, also called submultiple generators and relaxation oscillators, are used in obtaining lower frequencies from a radio-frequency standard. Experimental observations to determine the nature of short-time instabilities occurring in controlled multivibrators are given, and the measuring technique for checking the accuracy between successive time intervals or cycles to better than 1 part in 1,000,000 is described. It is pointed out that the arrangement can be used for supplying extremely short pulses accurately spaced in time.

The frequency of 1 c/s is added as a modulation on standard radio frequencies which are broadcast each Tuesday and Friday.

PAPER MAKING STUDIES OF RECORD PAPERS COMPLETED

The completion of experimental paper making tests in the Bureau's semi-commercial paper mill, made to find the effect of paper making processes and materials on the strength and stability of book papers, marks the end of a series of studies of this kind extending over the past 8 years.

The first part of this work dealt with writing papers. Papers were made from different grades of representative commercial rag and wood fibers used for such papers, and were given thorough chemical and physical tests to find the effect of fiber quality; of the beater-sizing materials, alum, rosin, and starch; and of the surface-sizing materials, glue and starch. Similarly, book papers were made from the particular grades of fibers commonly used for their manufacture, but here while rosin-sizing materials only had to be considered, study of the possible effects of the common filling materials, clay, titanium pigments, zinc pigments, and calcium carbonate or chalk, was also included.

This work showed, as have likewise extensive tests of commercial record papers, that the stability of such papers as found by accelerated aging by heating, is dependent mainly on the cellulosic purity of the fibers and the degree of acidity of the papers. Very stable papers were made from the higher grades of both rag and wood fibers, when the acidity imparted by alum was not excessive. Of the other sizing materials used, rosin had a minor deteriorative effect. No adverse effect on stability was found for starch, and

glue surface-sizing improved the stability of the less-stable papers. None of the fillers used for the book papers affected their stability, and that of the less-stable papers was appreciably improved by calcium carbonate. A report on the manufacture of the book papers is in the course of preparation. To round out other information obtained, such as effect of sizing and filling materials on strength, it is planned to make printing tests of the book papers and report the results in a subsequent publication.

The information obtained in this work assists the paper maker in his choice of raw materials and in making the best use of them, and adds to the information needed for adequate classification and specification of papers for the various classes of records.

STABILITY OF VISCOSE TYPE OF OZAPHANE PHOTOGRAPHIC FILM

A new type of photographic film, in some respects particularly adapted for the reproduction and preservation of records, was tested recently by Arnold M. Sookne, research associate of the National Research Council, and Charles G. Weber of the Bureau's paper section. As reported in the *Journal of Research* for September (RP1134), this film consists essentially of a strip of Cellophane only 0.002 inch thick. It has no gelatin emulsion, the image being obtained with a light-sensitive dye incorporated within the Cellophane base. This new type of film is only one-third as thick as the motion-picture type of safety film now in use for record purposes, and has the added advantages of being grainless, and not readily damaged by scratching.

The material was found to be insufficiently stable for use where the highest degree of permanence is desired. However, it appears to be well suited for uses requiring a life of 25 to 30 years. Longer life is probably not required of the reading-room copies of publications if the original negative copies are properly preserved, so that new positive prints can be made as required.

EVALUATION OF MOTION-PICTURE FILMS BY SEMIMICRO TESTING

Test methods have been developed at the Bureau for determining the quality and state of preservation of film-

slides and motion-picture films without damage to the films. The usual methods of evaluating film for permanent records require test specimens too large to be removed from record material in film form without damage to the image or making the film unserviceable otherwise. To make it possible for archivists and others charged with the preservation of such films to maintain a check on the condition of them, semimicro methods were developed at the Bureau for acidity, viscosity, and content of residual hypo; tests that had previously been found particularly significant in evaluating film. Punchings removed from the film with a small hand punch are used as test specimens, and these can be removed without any appreciable effects on the serviceability of the films.

FREEZING AND MELTING OF RUBBER

When crude rubber is stored during cold weather, it frequently loses its resiliency and becomes hard and opaque. If it is tightly compressed when baled for shipment, similar changes occur. The rubber is said to be "frozen" or "boardy". These changes in physical properties are caused by crystallization. The crystals melt when the rubber is warmed, and then the normal resilient properties are restored.

In the course of recent work by W. Harold Smith and Charles Proffer Saylor, specimens of *Hevea brasiliensis*, the ordinary rubber of commerce, and of its sol and gel fractions were crystallized at a suitably low temperature. In some cases the specimens were crystallized under conditions of stress. Microtome sections were then prepared, and examined at controlled temperatures under a polarizing microscope.

As reported in the *Journal of Research* for September (RP1129), when unstrained rubber was studied in this way, each section appeared to be composed entirely of irregular, strongly birefringent, crystalline particles exhibiting no systematic orientation with respect to each other. The crystalline rubber usually melted between 5° and 16° C, a range which was similar to that observed previously with discrete crystals of rubber which had been prepared from solution. In the case of the frozen specimens, however, the temperatures through which melting occurred were not the same in different pieces of frozen rubber, even when

they had been prepared from the same material and frozen simultaneously. The crystals in adjacent microtome sections cut from any piece of frozen rubber melted alike, but crystals in sections from widely separated parts of the same piece sometimes exhibited real differences.

When rubber was frozen while strained, crystalline groups tended to be oriented with their high refractive indices parallel to axes of elongation. A curious consequence of this was observed in strips of rubber which were stretched and then frozen. As freezing progressed, the continuing orientation of rubber molecules caused the strips to elongate about 4 percent beyond the length previously attained by the stretching. The melting temperatures of strained frozen rubber did not greatly differ from those of unstrained rubber, although they may have been slightly lower.

When rubber was "frozen" under pressure, the melting points of its crystals were higher than those determined without pressure, melting being not below 33° C. Vulcanized rubber did not crystallize at the temperatures used to produce crystals in unvulcanized rubber, but when lightly vulcanized rubber was stretched before being subjected to low temperatures, notable amounts of "freezing" occurred.

INDUSTRIAL USES FOR SILVER

As reported in Technical News Bulletin 254 (June 1938), the American Silver Producers' Research Project to develop new industrial uses for silver, originally organized as a 1-year project, was extended for a second year dating from June 1, 1938. Reorganization of the project and its staff to meet the changed conditions has now been completed.

The original fellowships have all expired, and only those that dealt with research, which on the basis of a survey of the first year's work at each institution seemed most promising, have been extended another year. Research Fellowships were again granted at Lehigh University (G. R. Van Duzee), Rensselaer Polytechnic Institute (D. P. Miles), Cornell University (L. W. Nielsen), and Batelle Memorial Institute (R. W. Dayton).

Two research associates, S. V. Wilson and C. S. Lowe, and a research clerk, I. H. Bleiberg, have been added to the project staff at the National Bureau of Standards.

Work in the fields which seem most promising is being conducted along the lines briefly indicated below:

Electrical contacts.—The program, heretofore concentrated on the purely electrical phenomena at the contact, has been widened to include research relating to effect of composition of copper-graphite and of silver-graphite brushes, wear of both brush and ring, harder silver alloys, effect of character of atmosphere, speed and applicability to alternating-current operation.

Bearings.—The occasional failure of silver bearings under very light loads, a phenomenon made more striking by the ability of such bearings to stand extreme service conditions, still remains the outstanding problem. However, much progress has been made in coordinating a joint attack by the bearing manufacturers, the engine builders, the military aviation departments and the oil suppliers.

The "oiliness" question is being attacked by making lead, tin, and other additions to the silver and by the addition of "oiliness" agents to the oils used. Parts of failed bearings are being examined for some chemical key.

Coatings.—Because silver is eminently suitable for maintaining flavor in stored liquids a major objective of the project is the development of silver-lined containers. There are two main divisions in this field: that of thin coatings, as for cans and various types of containers; and that of thick coatings, as for silver-clad chemical equipment.

The development of a coating that will be free from porosity and possess a minimum thickness so as to insure a large low-cost market is the immediate problem.

In the chemical equipment field it has been shown that silver-clad steel sheet will withstand all the punishment required to beat it into bowls or other dished shapes and still show good thermal conductivity. The wider adoption of chemical silverware is an objective.

The commercial possibilities of the brush-plating method for the coating of various metals with silver are also being explored.

Alloys.—An intensive study is being made at the National Bureau of Standards of certain selected alloy systems that show some promise of exhibiting properties that will offer economic justification of the alloys. In addition, the collection of useful engineering data on many of the 200 alloys prepared by the research associates is being continued as a matter of routine.

The effect of silver additions to tin bronzes has been studied in some detail, as preliminary work had shown appreciable precipitation hardening due to the silver in amounts approximating 5 percent. Working with cast alloys containing 10 percent of tin and from 1 to 5 percent of silver, the 3 percent of silver alloy was found most interesting and gives high physical properties in the "as cast" condition.

Some interesting effects produced by very small silver additions to ingot iron have been observed. It appears from the limited data now available that the silver additions reduce blow-hole formation and consequently reduce the "rimming" tendency.

Fungicides.—The results of the past year's research in this field were sufficient to justify its continuation. This work indicates that the best possibility from a tonnage standpoint lies in plaut sprays and numerous field trials are to be made along this line.

A progress report submitted to the sponsors July 1 offers a résumé of the work done under each fellowship during the past year. A limited number of copies of this Sixth Progress Report on the American Silver Producers' Research Project is available upon request. Inquiries should be addressed to A. J. Dornblatt, senior research associate, American Silver Producers' Research Project, National Bureau of Standards, Washington, D. C.

EXHIBIT OF SOIL-CORROSION SPECIMENS

An exhibit of soil-corrosion specimens has been arranged in the Industrial Building at the Bureau. The specimens, which were removed from the ground in 1937, are representative of pipe materials developed to resist corrosive soil conditions. Most of them are 12-inch lengths of 1.5-inch pipe. Among the ferrous specimens are representatives of puddled wrought iron, open-hearth iron, open-hearth steel, steel with several kinds and quantities of alloying elements, and six varieties of cast iron. The nonferrous specimens include two varieties of copper; several varieties of brass and bronze; soldered joints; and brazed joints. The pipe coatings include three rubber coatings, two new paints, and several experimental coatings. There are also specimens of cement-asbestos pipe. Most of the specimens have been exposed for 4 years in 15 soils differing widely in their characteristics.

In the past, a number of manufacturers have made detailed studies of similar specimens. Those desiring to do so in the present case should make arrangements in advance with K. H. Logan, Room 207, East Building, National Bureau of Standards, Washington, D. C. Such an examination will facilitate the criticism of a report on the specimens, now in preparation, which will be submitted to cooperating manufacturers before publication.

STRENGTH OF A RIVETED STEEL RIGID FRAME

In recent years rigid frames have found increasing use in building a wide variety of structures, such as bridges, auditoriums, hangars, and warehouses. In this type of construction the ends of component members are so connected as to prevent relative rotation of the ends at any connection.

Often a considerable saving in material results from the use of the rigid frame, and advantages of beauty and convenience may also be important. However, as no satisfactory method of computing the stresses in the knees, that is, at the junctions of component members has been available, many designers have been reluctant to use this construction.

At the Bureau, an investigation of the strength of rigid frames has been conducted with the cooperation of the American Institute of Steel Construction. RP1130, by Ambrose H. Stang, Martin Greenspan, and William R. Osgood, in the Journal of Research for September, gives results of tests on a rigid-frame specimen donated by the Bethlehem Steel Co.

The distribution of stress in the specimen was obtained from strain measurements for various conditions of loading and the maximum load that could be sustained was also determined.

As the magnitude of the stresses in the outer corner was in question, duplicate tests were made with and without reinforcement. It was found that the stresses in the outer corner were generally small, and that the presence or absence of the reinforcement had little effect on the distribution of stress in the specimen.

The ordinary beam theory was found to be adequate for designing the legs. A theory for the distribution of stress in the web of the knee was developed, the calculated stresses being in satisfactory agreement with those obtained by measurement.

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SURFACE TENSION OF VITREOUS-ENAMEL FRITS

In the fusing of vitreous enamel on metal shapes, both the consistency and surface tension of the molten frits have often been considered important in regulating the degree to which the material smooths out over the metal surface. The consistency of eight typical commercial frits has been determined at the Bureau, and reported as the first part of a study on these two properties. RP1133, by William N. Harrison and Dwight G. Moore, in the Journal of Research for September, is concerned with the surface tension. This property is determined by weighing the liquid supported by the meniscus adhering to a platinum cylinder when the bottom edge of the cylinder is at the level of the undisturbed surface of the molten specimen. The test procedure permits the force of gravity to hasten the attainment of equilibrium rather than to retard it, as is usual in most surface tension measurements. This difference is important in determinations on highly viscous liquids. The procedure also insures a zero angle of contact and eliminates the necessity of determining the specific gravity at the temperature of test. Results are in good agreement with those obtained by the bubble-pressure method on molten sodium chloride, and also on a soft ground-coat frit at a viscosity of 400 poises. The results obtained on seven of the typical commercial vitreous enamel frits at 850° C showed maximum differences of less than 10 percent. The mean value was approximately 250 dynes per cm, while that for a high lead composition was about 200 dynes per centimeter. The surface tension in all cases increased with decreasing temperature between 925° and 775° C, the maximum increase being less than 10 percent. Mill additions had very little effect on the surface tension. Apparently, variations in consistency are more effective than variations in surface tension in influencing the ease with which enamels flow out to form a smooth surface when fired.

EFFECT OF ALKALIES ON PORTLAND CEMENT CLINKER

Although the alkalies generally are referred to as being among the minor constituents of portland cement clinker, it is recognized that K_2O and Na_2O may combine with other oxides present in such a manner as to be of great effect in determining the ultimate composition.

As part of the research program of the Portland Cement Association Fellowship at the Bureau, the manner in which K_2O is combined in portland cement clinker is to be established, step by step, by a series of phase equilibria studies involving K_2O and the other constituents. The results of a previous investigation of the system $CaO-K_2O-Al_2O_3$ show that $K_2O \cdot Al_2O_3$ is the only compound of K_2O in that system which exists in compositions related to portland cement compositions. A paper by W. C. Taylor (RP1131) in the September Journal of Research shows that $K_2O \cdot Al_2O_3$ likewise is stable in the presence of $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$. Furthermore, the compound $K_2O \cdot Al_2O_3$ can exist in the presence of $2CaO \cdot Fe_2O_3$, which may be present in rare instances in cements having an Al_2O_3/Fe_2O_3 ratio less than 0.64.

Phase equilibria studies on mixtures of $K_2O \cdot Al_2O_3$ and the other constituents of cement clinker necessarily must follow. In the event that such studies indicate that $K_2O \cdot Al_2O_3$ is stable in the presence of $3CaO \cdot SiO_2$ and $2CaO \cdot SiO_2$, then it may be that $K_2O \cdot Al_2O_3$ exists in clinker. On the other hand, if $K_2O \cdot Al_2O_3$ reacts with any of these compounds to form a new combination, such as $xCa \cdot O_yK_2O \cdot zSiO_2$ or $xK_2O \cdot ySiO_2$, then it will be necessary to study the relations of that combination with the various cement constituents: $3CaO \cdot Al_2O_3$, $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$, etc.

In view of recent discoveries, the latter condition appears to be likely. With the development of the technique for examining polished sections of clinkers in reflected light, a dark prismatic interstitial material has been observed in many commercial cement clinkers. It was found that this material did not occur in alkali-free laboratory preparations, but did exist if either or both Na_2O and K_2O were present. The mean refractive index of this weakly birefracting phase was found to be near 1.72. No crystals possessing optical properties similar to those of $K_2O \cdot Al_2O_3$ were observed.

NEW AND REVISED PUBLICATIONS ISSUED DURING AUGUST 1938

Journal of Research²

Journal of Research of the National Bureau of Standards, volume 21, number 2, August 1938 (RP1120 to RP1128, inclusive). Price 30 cents. Annual subscription, 12 issues, \$2.50.

² Send orders for publications under this heading only to the Superintendent of Docu-

Research Papers²

[Reprints from May and June 1938 Journal of Research]

- RP1092. Effect of carbon on the critical cooling-rate of high-purity iron-carbon alloys and plain carbon steels. Thomas G. Digges. Price 10 cents.
- RP1095. Analysis of phosphate rock. James I. Hoffman and G. E. F. Lundell. Price 5 cents.
- RP1097. Boiling points of benzene, ethylene chloride, *n*-heptane, and 2, 2, 4-trimethylpentane over the range 660 to 860-mm pressure. Edgar Reynolds Smith and Harry Matheson. Price 5 cents.
- RP1098. Suitability of various plastics for use in airplane dopes. Gordon M. Kline and Cyrus G. Malmberg. Price 10 cents.
- RP1099. Minimum perceptible colorimetric purity as a function of dominant wave length. Irwin G. Priest and Ferdinand G. Brickwedde. Price 5 cents.
- RP1101. A portable apparatus for measuring vibration in fresh concrete. George L. Pigman, Floyd B. Hornbrook, and Jesse S. Rogers. Price 10 cents.
- RP1104. Pyranose-furanose interconversions with reference to the mutarations of galactose, levulose, lactulose, and turanose. Horace S. Isbell and William W. Pigman. Price 10 cents.

Circulars²

- C420. Propane, butane, and related fuels. E. R. Weaver. Price 5 cents.

Technical News Bulletin²

Technical News Bulletin 256, August 1938. Price 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL

Letter Circulars

Letter Circulars are prepared to answer specific inquiries addressed to the

ments, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents a year; Journal of Research, \$3.50 a year (United States and its possessions, and Canada, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Newfoundland (including Labrador), Panama, and Venezuela); other countries, 70 cents and \$4.50, respectively.

National Bureau of Standards, and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.

LC528. Testing laboratories equipped for thermal expansion tests of solids. (Supersedes LC234.)

LC529. Vehicle-Scale Testing Service of the National Bureau of Standards conducted in cooperation with the States; November 1936 to May 1938.

LC530. Salt-spray test.

LC531. Photography and its applications: Publications by members of the staff of the National Bureau of Standards. (A list.) (Supersedes LC332.)

RECENT BUREAU ARTICLES
APPEARING IN OUTSIDE PUBLICATIONS³

Projet de législation fixant les étalons des poids et mesures des Etats-Unis. Lyman J. Briggs. *Revue de Métrologie Pratique et Légale Poids et Mesures* (102 Rue de la Tour, Paris, France) 15, No. 6, 1 (June 1938).

Standard test methods check magnetic properties of materials. Raymond L. Sanford. *Industrial Standardization and Commercial Standards Monthly* (29 West 39th St., New York, N. Y.) 9, 159 (July 1938).

Discussion of S. Chapman's note on radio fadeouts and associated magnetic variations. J. H. Dellinger. *Terrestrial Magnetism and Atmospheric Electricity* (Johns Hopkins Press, Baltimore, Md.) 42, 179 (June 1938).

Apparatus and methods for determining thermal properties of petroleum products. R. S. Jessup. Reprinted from the *Science of Petroleum* (Oxford University Press, Oxford, England) 1224 (1938).

The physical aspects of ultraviolet therapy. W. W. Coblenz. *J. Am. Medical Assn.* (535 North Dearborn St., Chicago, Ill.) 111, 419 (July 30, 1938).

Influence of copper and iron salts on the behavior of leather in the oxygen bomb. Joseph R. Kanagy. *J. Am. Leather Chemists Assn.* (Ridgway, Pa.) 33, 352 (July 1938).

³ These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

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